lies in its path. Suppose the cartilage had not developed until after the nerve had grown quite past this point; it would then be easily conceivable that the form of the nerve stem might have been quite different. The sequence of events becomes, then, a matter of prime importance, and he summarizes it for this period as follows: 1. Formation of the myelospongium (the non-nervous framework); 2. development of axis cylinders from the nerve cells; 3. formation of first nerve trunks leaving the center; 4. development of the outlines of the skeleton; 5. gradual growth of the nerve trunks towards the periphery; 6. development of the protoplasmic processes from the cells in the central system.

For brain anatomy the paper is specially important; for many current views regarding the nature and significance of the cranial nerves will find in it their best evidence, as well as their most serious difficulties.

Ueber die Bestandtheile des vorderen Kleinhirnschenkels. W. BECTEREW. His and Braune's Archiv, 1888, No. 2 bis 4, S. 124.

On the basis of embryological studies Becterew describes, in the superior peduncle of the cerebellum, four bundles of fibers which acquire their medullary sheaths at different periods. A transverse section between the corpora quadrigemina and the cerebellum in the adult shows dorso-laterally on either side of the middle line the conspicuous crescent formed by the fibers of the superior peduncle. Referring to such a section, the author describes these four bundles as occupying the following positions: (1.) The first is earliest developed, and is found in the sharp ventral angle of the crescent. It does not arise from the cerebellum, but is lost in the principal nucleus of the vestibular nerve. Small in extent, it passes as far as the cephalic edge of the pons where the fibers cross the middle line as a commissure. This is the ventral bundle. (2.) The second in order is the dorsal bundle which forms the dorsal portion of the crescent, and arises from the nucleus fastigii and the cortex of the vermis on the corresponding side. (3.) Between these two, on the lateral curve of the crescent, appears the so-called middle bundle, the fibers of which mix partially with those of the bundles just described. In the cerebellum these fibers are in connection with the nuclei globosus and emboliformis. (4.) The last to develop is the one filling the remaining space along the mesial curve of the crescent, the inner bundle. It arises in part from the corpus dentatum and the cortex of the cerebellar hemispheres. The three bundles last named form the superior peduncle proper, and crossing the middle line end in the cells of the red nucleus. Becterew regards these three as a physiological continuation of the bundles which form the inferior peduncle of the cerebellum.

The Development of the Peripheral Nervous System of Vertebrates (Part I, Elasmobranchii and Aves). J. BEARD. Quart. Journ. Micr. Sci., Vol. XXIX, 1888, pp. 153–227, plates 16-21.

This elaborate paper is a continuation of the author's morphological studies upon the development of the peripheral nervous system of vertebrates, and is very largely discussional. According to Beard, the spinal ganglia of vertebrates are formed as differentiations of the inner layers of the epiblast just without the limits

of the neural plate. The "Zwischenstrang" of His has no share in the formation of the ganglia, and the "Zwischenrinne" of the same anatomist has no existence. After separation from the epiblast, the neural cranial ganglia and the spinal ganglia are carried up with the closing in of the neural tube, and come to lie between its lips, but are quite distinct from the central nervous system. The neural cranial ganglia grow towards the lateral epiblast at the level of the notochord and fuse with it. In addition to the four elements of the anterior and posterior roots, two ganglionated and sensory, two motor and unganglionated, the cranial nerves contain a fifth element, derived from the lateral or branchial sense organs. Beard confirms the opinion of Balfour respecting the origin of the anterior roots of cranial and spinal nerves. F. T.

Sur la persistance de l'aptitude régénératrice des nerfs. C. VOULAIR. Bull. de l'Acad. d. Sc. de Belge [3], XVI, 7, p. 93.

The author cut the sciatic nerve in dogs and obtained the usual regeneration. Hoping to get this a second time in the same dog, he again cut the nerve, but without the desired result. The failure of the tissue to renew itself a second time in this case he attributes to the disturbance of the circulation, etc., following the operation, and to the resistance which the peripheral connective tissue offers to the proliferation. On the other hand, he did obtain regeneration for the second time in the poplitaeus internus of the dog, and concludes, from two successful experiments, that the same nerve may regenerate itself at least twice, perhaps more often.

Ueber die centrale Endigung des Nervus opticus bei den Vertebraten. J. BELLONCI. Mit 8 Taf. u. 4 Holzsch. Zeitschr. f. Wissen. Zool., B. 47, H. 1, 1888.

During the past ten years Bellonci has published a number of papers on the finer anatomy of the central nervous system, and his work has been for the most part comparative. All this gives him facility in handling a complicated problem like the one indicated in his title. He has worked over the optic centers and nerves in the reptiles and batrachia, the teleost fish, the birds, and the mammals, thus obtaining four types for comparison. The method which was most successful was a staining and hardening in osmic acid, followed by clearing the section with ammonia. The effect of this treatment was to leave visible only the fibers stained with osmic, the remainder of the section becoming completely transparent. Most of the numerous figures accompanying the paper are made from such specimens, and certainly show the fibers with great clearness. The disadvantage of the method is that only small pieces of tissue can be used, and therefore the brains employed must always be of small size. The plan of the investigation is an analysis of the fiber systems found in the optic tract and the adjoining regions, and a following of each of these to its termination. In pursuing such a plan, much detailed description is required, which it is of course impossible to summarize. The optic fibers proper are traced to their destination by the study of serial sections in several planes. This method leads to the general conclusion that all optic fibers end in the corpora optica, the homologues in the vertebrate series of the corpora quadrigemina anteriora in man. The fibers coursing